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Article (Published Version)

Agpar, J Marina, Bastakoti, Ram, Hak, Sochanny, Nurick, Robert and Tsatsaros, Julie (2017) Working towards an engagement turn to agricultural research in the Tonle Sap Biosphere, Cambodia. *Cogent Food & Agriculture*, 3. p. 1368108. ISSN 2331-1932

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FOOD SCIENCE & TECHNOLOGY | RESEARCH ARTICLE

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Cogent Food & Agriculture (2017), 3: 1368108



Received: 10 May 2017
 Accepted: 13 August 2017
 First Published: 24 August 2017

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Reviewing editor:
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Working towards an engagement turn to agricultural research in the Tonle Sap Biosphere, Cambodia

J. Marina Apgar^{1*}, Ram Bastakoti², Sochanny Hak³, Robert Nurick^{4,5} and Julie Tsatsaros⁶

Abstract: A new generation of agricultural research programs are embracing use of participation as a vehicle for achieving greater impact and supporting transformative change in complex social-ecological systems. In this paper, we share learning from use of participatory action research in the Tonle Sap biosphere in Cambodia, as the main implementing methodology within a large multi-partner agricultural research program. We describe the program's espoused approach to applying participatory methodologies focusing on co-ownership, equity and reflexivity with stakeholders throughout the research process. We then reflect upon our practice as we pursued initiatives to support increased income and nutrition outcomes for the poorest people in a diverse aquatic agricultural system characterized by inequality. We discuss the challenges and early successes of the process and share three enabling conditions that support a shift towards quality of participation in agricultural research: (1) focusing at the outset on a strengths-based mind-set, (2) staging a critical stance to progressively build equity in process and outcomes, and (3) institutionalizing reflexivity to facilitate ongoing learning.



Robert Nurick, Sochanny Hak

ABOUT THE AUTHORS

The authors of the paper worked collaboratively to design and implement participatory action research through the CGIAR Research Program on Aquatic Agricultural Systems between 2011 and 2016. Marina Apgar, Sochanny Hak and Julie Tsatsaros were part of the core implementation team of the leading organisation in Cambodia—the WorldFish Centre. Sochanny Hak led the fieldwork working with the community facilitators. Robert Nurick of the University of Sussex developed and facilitated the capacity building program for the participatory action research approach used in the selected villages. Ram Bastakoti is a scientist with the International Water Management Centre, and provided technical support to the land and water management research initiative.

PUBLIC INTEREST STATEMENT

Empowerment and participation are part of the development mantra and are influencing how agricultural research and development is pursued. In this paper we share our experience of using participatory action research as an approach to agricultural research in the Tonle Sap lake in Cambodia. Through the process we hoped to enable voices of the poor and marginalized to be heard by government and non-government agencies responsible for promoting development. We facilitated a dialogue between villagers and agencies. Central to our approach was the training and capacity-building in action research of community facilitators recruited from the villages to lead the process. Our greatest success was building skills of facilitators to be strengths-based and reflexive practitioners. The greatest challenges we faced were addressing the systemic structural inequalities and power relations within villages and between villages and agencies.

Subjects: Environment & Agriculture; Development Studies, Environment, Social Work, Urban Studies; Development Studies

Keywords: participatory action research; equity; reflexivity; outcomes; strengths-based; agricultural research

1. Introduction

Aquatic agricultural systems are complex social-ecological systems characterized by high levels of uncertainty (Attwood et al., 2017). In African, Asian and Pacific floodplains, deltas and coastal-marine areas, 500 million people live and depend on these systems, and 138 million live in poverty (Béné & Teoh, 2014). In these conditions of uncertainty and high inequality, supporting rural livelihoods requires research that integrates disciplines, works across scales and engages multiple stakeholders, including the poor and marginalized (Lovell, Mandondo, & Moriarty, 2003; Marsden & Morley, 2014; von Braun et al., 2009).

Approaches that engage farmers directly in research processes, and connect them with policy makers, civil society, private and other actors have evolved to now include people-centered approaches (Pound, Snapp, McDougall, & Braun, 2003; Scoones, Thompson, & Chambers, 2009). Similarly, in natural resources management (NRM), participation and collaboration are now seen as central to reducing poverty, and specifically in aquatic agricultural systems (Apgar et al., 2017; Ratner et al., 2013). A new generation of agricultural and NRM programs are, therefore, embracing the centrality of participation (Douthwaite et al., 2015; Hawkins et al., 2009). Further, emphasis on the marginalized within them moves beyond the technical to engage with social and institutional dimensions, recognizing the role of power relations (for example Cornwall, 2003; Nightingale, 2002). In spite of this progress, implementation of such approaches remains challenging and is often on the fringes of mainstream agricultural research programs focusing on technological development (Hawkins et al., 2009).

In this paper, we contribute understanding about how to implement participatory approaches to agricultural research that aim to engage with the poor and marginalized in social-ecological systems. We do so through our experience of implementing the CGIAR Research Program on Aquatic Agricultural Systems (CRP AAS). CRP AAS explicitly set out an agenda for use of participatory action research (PAR) for program planning, monitoring and evaluation, and developed principles to enable co-ownership by stakeholders, and to use critical reflection for transformative change in the interest of the poor and marginalized (AAS, 2011; Apgar & Douthwaite, 2013). We start with a brief review of the evolution of PAR within agricultural research, indicating where challenges remain. We then describe the program, its research design and the context of the Tonle Sap biosphere in Cambodia. Through reflecting on our process of implementation over the first two years of the program, we share our findings in the form of learning about critical factors and conditions that enable or inhibit the use of this form of PAR as an approach to agricultural research. As we discuss our findings we provide recommendations for researchers pursuing similar approaches.

2. Evolving role of PAR in agricultural research for development

A new generation of participatory approaches in agricultural research has moved beyond critique of the original “farmer first” movement of the 1980s (e.g. Bentley, 1994; Cooke & Kothari, 2001). They appreciate participation as a process and not a set of tools, and more deliberately and critically engage with power and institutions. They are often found within innovation and people-centered approaches (Klerkx, van Mierlo, & Leeuwis, 2012; Scoones et al., 2009) in which agricultural research is understood to take place within a complex social-ecological system. Participation is posited as a central vehicle for research to engage with stakeholders in the innovation process, building their capacity to learn and adapt. PAR, consequently, is proposed to guide participation within agricultural research (e.g. German & Stroud, 2007; McDougall, Leeuwis, Bhattarai, Maharjan, & Jiggins, 2013). PAR is a broad field of practice with many context specific uses and approaches (e.g. Reason & Bradbury, 2008). All are characterized by being values-based, action-oriented, and participatory

(Popplewell & Hayman, 2012). Approaches to PAR that emphasize researchers as engaged with and embedded within complex systems (e.g. Burns, 2007; Phelps & Hase, 2002) are particularly well-suited to working within an innovation systems approach to agricultural research.

Enthusiasm for use of PAR aside, there is evidence to suggest that in practice challenges remain. Examples from NRM programs espousing PAR illustrate that building institutional and researcher commitment to the approach remain challenging (Colfer et al., 2011; Ojha, Hall, & Sulaiman, 2013). This is related to the constructivist epistemological stance of PAR that explicitly challenges positivist views of knowledge generation and the power of researchers over subjects. Using PAR, as noted by Pretty and Chambers (1993) over twenty years ago, requires a “new professionalism” that includes accepting research as an open-ended learning process. This leads to a tension often encountered by practitioners in putting action before inquiry (Arieli, Friedman, & Agbaria, 2009). Yet even when these institutional challenges are overcome, the capacity to facilitate multi-stakeholder engagement and manage power relations within them is not easily developed. Facilitators must bring a critical stance to their practice and be able to move beyond superficial group dynamics to engage with power on their feet (Maguire, 1987) to support more equitable and inclusive innovation processes. The tension between supporting a collective process while at the same time making sure the voices of all in the room are heard is well-recognized by experienced practitioners (Roberts & Dick, 2003). These challenges continue to be thorny issues for those attempting participation within agricultural research programs (Neef & Neubert, 2011).

3. Program context and design

CRP AAS was one of three “systems” programs funded through the CGIAR. It was led by WorldFish, an international agricultural research centre focused on poverty reduction and implemented in partnership with the International Water Management Institute and Bioversity International. CRP AAS explicitly embraced the idea of participation to address power relations and reach the marginalized (AAS, 2011; Kantor & Apgar, 2013). The program design represented a fundamental departure from “business as usual” agricultural research in the CGIAR that had historically used participation in a more instrumental way (Douthwaite et al., 2015, 2017). It was implemented in five aquatic agricultural systems with high numbers of poor and marginalized in Africa, the Pacific and Asia (AAS, 2013).

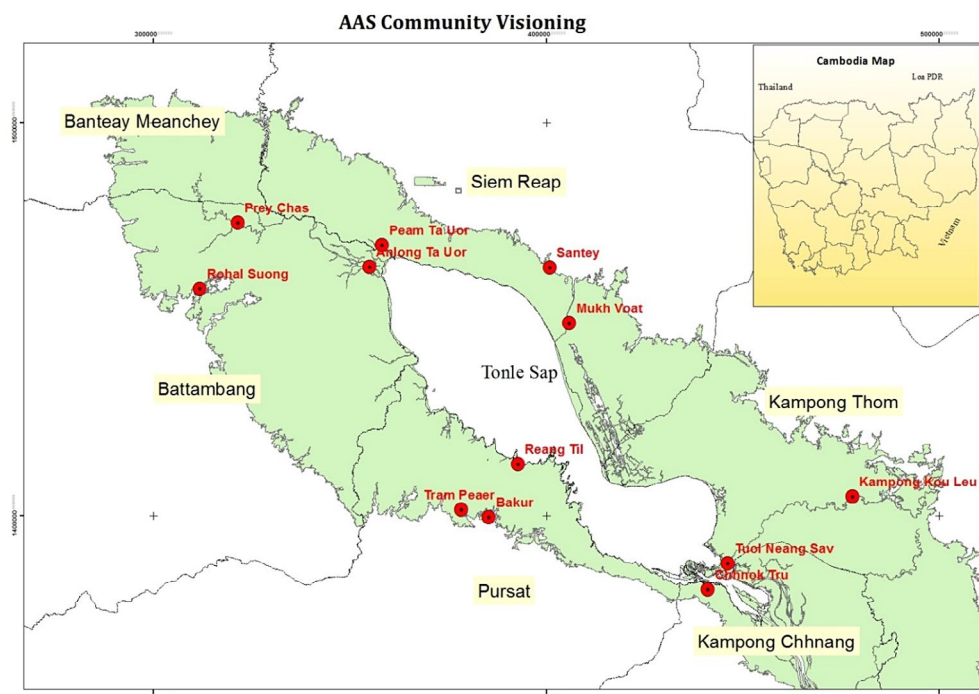
The Tonle Sap biosphere in Cambodia was one of the sites. The biosphere is in the central plains of Cambodia (see Map 1) where the floodplain of the Tonle Sap Lake, together with the Tonle Sap and Mekong Rivers make up the largest continuous areas of natural wetlands habitats remaining in the Mekong system (Sarkkula et al., 2004). It is known for its rich biodiversity and its unusual water regime. Variations in water depth annually range from 1 m in the dry season to up to 10 m in the wet season and the surface area increases from 2,500 km² in the dry season to up to 15,000 km² in the wet season (Kummu et al., 2014; Kummu, Sarkkula, Koponen, & Nikula, 2006), resulting in a highly productive floodplain ecosystem (Lamberts, 2006).

The people of the Tonle Sap have historically engaged with the hydrological cycle to secure their livelihoods, based mainly on fish and rice production (Keskinen, 2006; Natter, 2000; Varis et al., 2006). Today, millions of people depend upon the Mekong lowlands area. In Cambodia, the dependent population is diverse ethnically and socio-economically, illustrating variations in livelihood practices, unequal access to natural resources, and insufficient rights of land tenure. Further, the ecosystem is extremely vulnerable to climate change (Keskinen et al., 2010; Nuorteva, Keskinen, & Varis, 2010; Västilä, Kummu, Sangmanee, & Chinvanho, 2010) influencing cropping cycles and fish catches. Management of the natural resources in the biosphere is in the hands of overlapping and conflicting institutional arrangements (Keskinen & Varis, 2012) resulting in poor governance. Of particular concern is the exclusion of local people in decision-making processes (Keskinen & Varis, 2012).

In this complex and multi-layered aquatic agricultural system, CRP AAS engaged both with a select number of local communities spread across various agro-ecological zones in the floodplain, and with a range of “system level” stakeholders (Apgar & Douthwaite, 2013) to support achievement of collective visions of success.

Map 1. Tonle Sap, Cambodia showing the 12 villages in the Tonle Sap lake where CRP AAS engaged.

Source: ADIC, 2014. Report from Community Visioning and Action Plans in Tonle Sap Lake, Cambodia.



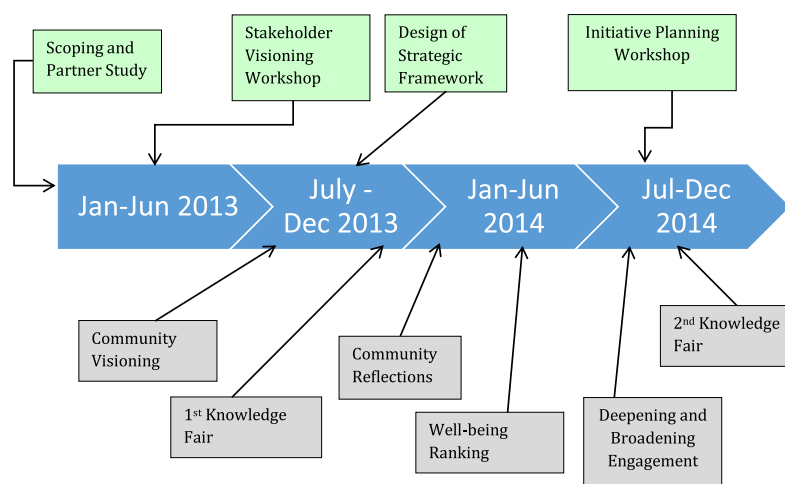
4. Research methods

We the co-authors of this paper were members of the program implementation team, some working locally with communities and local facilitation teams and with stakeholders of the Tonle Sap biosphere, some engaging with national stakeholders in Cambodia and others providing support to the field teams through direct and distance accompaniment and mentoring. Issues of positionality, power, knowledge construction and representation are central to all research claims (Merriam et al., 2001). The methods of PAR are both personal and embodied (e.g. Sherman & Torbert, 2000), embracing the notion of “reflexive research practice”, whereby the researcher examines how their agenda, assumptions, beliefs and emotions influence the outcome of the research process (Gluck & Patai, 2013). In this sense, as PAR practitioners, we recognized our relative position of power as researchers when communicating with our co-researchers in communities. We used reflexivity at multiple-levels to draw learning from our practice—a method akin to Coghlan and Brannick’s (2005) meta-level reflection that researchers engaged in action research use to consolidate their own learning. We drew upon the analysis that was implemented at the local level with facilitation teams, to then focus our own analysis on the following research question: “What are the critical factors that enable or inhibit a PAR approach to agricultural research in aquatic agricultural systems to be implemented according to principles of co-ownership, equity and reflexivity?”

To guide our reflections and collective analysis on our PAR methodology, the program identified at the outset a set of principles used to help guide implementation in each of the program sites. Three principles build on literature and practice: (1) co-ownership of the research process by participants who define their real-life problems to be addressed and become co-researchers, (2) equity in process and outcomes through facilitators recognizing and engaging with power relations to create space for the poor and marginalized, and (3) reflexivity guiding the process and linking across scales (adapted from Apgar & Douthwaite, 2013). We used multiple data streams to inform our reflexive research practice.

Documentation of the process was our main data stream, and included field reports from local facilitation teams, reports from all major program events including participant evaluations and systematic after action review sessions. We draw upon this to present our experience of implementation in the following section. We triangulated our results through conducting open-ended interviews

Figure 1. Timeline of main events of PAR implementation.



with local facilitators and partner organizations, as well as scientists working on agricultural research initiatives to document their reflections and learning about the PAR methodology. Finally, we implemented two focus group discussions with members of two NGO partners and senior researchers from WorldFish to explore how PAR can be internalized within agricultural research institutions. We draw upon these data sets in presenting our results and building our argument.

5. Implementation of PAR in the Tonle Sap Hub

In this section, we describe the events of the PAR processes in the Tonle Sap that took place over two years. We discuss both the system and community level cycles of PAR (as shown in Figure 1) through key moments. The grey boxes at the bottom show key moments in community engagement and the green boxes above are the system level engagement moments. We discuss them chronologically through a narrative to show how connections between the two engagement streams of PAR occurred in practice.

5.1. January–June 2013: Initiating system level stakeholder engagement

Engagement with stakeholders started during a participatory planning phase with a wide range of relevant government and non-government institutions. A scoping study of the Tonle Sap was conducted with stakeholders and included a capacity assessment of local development NGOs, used to identify with whom to build a network of agencies critical for systemic change. The first stakeholder workshop in June 2013 included government representatives from Agriculture, Forestry and Fisheries, Water Resources and Meteorology departments, fish and rice traders from the provincial capital (Siem Reap), representatives from five local villages, ten local NGOs and three international NGOs. This initial group articulated their guiding vision for CRP AAS in the Tonle Sap, known as the hub development challenge (HDC):

To make more effective use of knowledge networks and practices for improving land and water management and value chains to optimize productivity from the flood pulses and assist communities that depend on the flood pulses to diversify their livelihoods, ensure food and nutrition security and maintain a healthy ecosystem.

Stakeholders agreed the selection of twelve villages to take part in the community level PAR process across three agro-ecological zones: water based villages, land based villages and transition (land/water based) villages. Further, nine NGOs were selected to support local implementation based on their presence in the selected villages, the level of commitment to working in these villages and their alignment with the HDC goal.

In the workshop evaluation, stakeholders from the provincial and national levels said that having NGOs, local authorities and representative villagers in the discussions enabled better understanding of the local situations and contexts the HDC is focused on supporting.

5.2. July–December 2013: Initiating community level engagement, linking to program design and reflecting on progress

Community level engagement took place in twelve villages, four located in each agro-ecological zone (see Map 1). NGOs working in each village recruited and supervised two community facilitators (CFs) (one male and one female) to facilitate the process. The CFs were selected based on their rapport with community members and local authorities, their willingness to engage in voluntary work, and ambition to foster change in their communities. They worked closely with the program implementation team made up of both local NGO staff members and CGIAR researchers, and together were referred to as the “community facilitation team”.

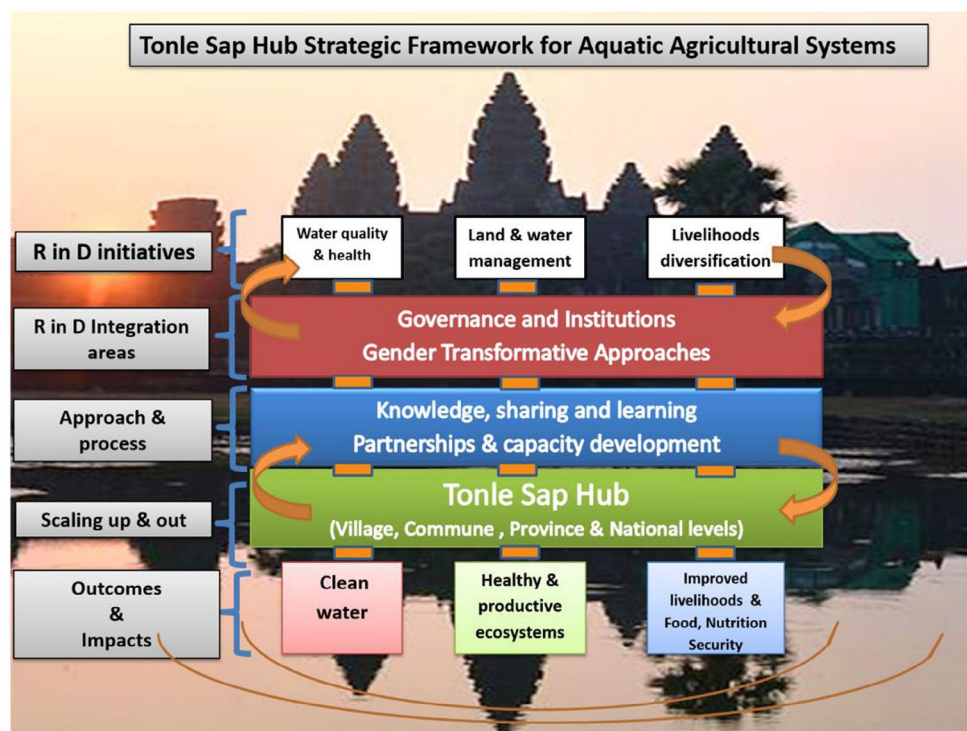
The community facilitation teams were trained in facilitation techniques using a strengths-based approach known as the Community Life Competence Process (CLCP).¹ A strengths-based approach emphasizes people’s self-determination, and communities are viewed as resourceful and resilient instead of weak and vulnerable (McCashen, 2005). The techniques included active listening, visual participatory methods (e.g. mapping) and team-building exercises to be used for the initial visioning. Members of partner NGOs who attended the facilitation training in August 2013 expressed appreciation of the simplicity of the strength-based tools they were trained in, and the active listening they felt reinforced their work as community development professionals. As one of them said: “... we use simple terms like dream building and after action review. The connections between the way of thinking and the way of working and the tools are very clear. Also, it is good that we focus on listening and learning from people instead of teaching or telling them what to do”.

The teams then implemented community visioning and action planning with villagers. They spent three days in each village, staying overnight with families. On the job training continued as daily reflections helped identify opportunities for improving facilitation. The partner NGO working in each village convened the initial groups of villagers, which tended to be existing groups they had a relationship with. In several villages, these groups were already constituted as committees. In some cases, the NGO extended invitations to other villagers to join the existing group. The groups comprised of both men and women. They developed their vision for their community and analysed opportunities and challenges towards achieving it.

Villagers then developed action plans that they committed to implementing using their own resources. The action plans of the land based villages mainly focused on improvements in water management though a range of activities such as restoring lakes, dams and dykes to rehabilitating infrastructure for dry season rice cultivation. For water based villages and those in the transition zone, the focus of activities concentrated on improving productivity of fishing through, for example, establishing savings groups for generating capital to invest in fish farming. Further, they identified actions to strengthen the governance and regulations of fishing, including lobbying to change laws on permissible fishing gear and establishing community-based management. Other activities aimed at increasing productivity of home vegetable gardens and livestock rearing. Health focused activities concentrated on awareness raising and hygiene, and aimed at improving access to health services. Developed in September 2013, the community action plans were set for a six-month period to ensure villagers saw some quick results while at the same time revealing opportunities for research activities to link across emerging local and system level goals.

In November 2013, stakeholders who co-owned HDC development came back together to design a program of work to tackle it. The community visions and resulting action plans from the twelve villages were shared with all system level stakeholders, who, through facilitated dialogue, identified opportunities that would help respond to the specific community visions and tackle the HDC. The workshop process, therefore, enabled a grounding of the design in the community-identified opportunities and goals. The resulting strategic framework, shown in Figure 2, identifies three broadly

Figure 2. The strategic framework for CRP AAS in the Tonle Sap designed by key stakeholders.



defined research initiatives; water quality and health, land and water management and livelihoods diversification, and two integration areas on governance and institutions and shifting gender norms. Stakeholders drew the framework on to the backdrop of the Angkor Wat Khmer temple, an indicator of the depth of co-ownership felt by the group.

Stakeholder evaluations of the design process noted that the resulting framework seemed to be realistic “... a realistic and participatory strategic framework that is achievable, provides hope to local people in poverty reduction through AAS research initiatives”, as one participant noted. Others remarked positively on the community grounding of research design process, for example: “Local community members can decide on research topics that fit to their own dreams, prioritizing community dream elements; the workshop provided an opportunity to bring practical experiences from the field to share with others and, community issues were discussed to develop and transfer community visions into the strategic plan”. Some, however, provided caution on the quality of local engagement and identified ways to build a more robust process, as one person said: “AAS should be integrated into existing local projects, we need more information on existing local institutions/partners, strengthening existing local institutions, engaging local authorities to be involved in the AAS program. AAS activities must be interrelated into the commune investment plan/commune development plan”.

The final PAR activity for 2013 brought the local facilitation teams from the twelve villages together to reflect upon their experience and share knowledge across their localities. This was the first “knowledge fair” and in response to feedback from community members and other stakeholders, commune councillors and village chiefs were invited. As explained by one participant: “The Knowledge Fair is ... a platform for sharing knowledge and experience from one community to another community, from community to NGOs, and also from communities to commune authorities”. The collaborative reflection led to three insights on the PAR process: (1) the community facilitation teams felt that their capacity development journey was only just beginning and suggested that greater on-site

support was required to ensure quality and rigour in their work, (2) all participants felt it would be beneficial to have more village to village support so that villagers could learn from each other, and (3) there was a need to broaden government participation beyond just the Fisheries Administration.

5.3. January–June 2014: Reflections on community action plans and well-being ranking

In early 2014, the community facilitation teams reconvened to plan the community reflections and review of progress. Teams were introduced to further visual participatory methods designed to facilitate reflection by village participants, including use of matrices and scoring techniques (see Nurick & Apgar, 2014). At this stage, there was much discussion amongst the team about who had been engaged in the initial visioning and action planning, and who might have been missing from the original groups. Apart from knowing that both men and women had participated, the teams knew little about their differences in socio-economic status, livelihood opportunities, access to assets, or location of their houses. Consequently, new PAR tools were introduced to better understand who was participating and who was not. A map of the village was used to record where participants lived—the “monitoring map”—and a participatory well-being ranking exercise was designed to understand the socio-economic context better.

From April to June 2014, teams spent three days in each village facilitating reflection and review of action plans and conducting well-being ranking exercises.² The review of action plans in each village revealed that progress made in implementing community action plans was mixed. Some had not progressed much because of a lack of resources or lack of clear champions to mobilize collection action. As villagers reviewed their progress, some described early positive changes in collective action. For example, in a land-based village, they explained how power relations were challenged through implementation of their action plan on improving irrigation systems:

There used to be long discussions about expanding the canal, ... but no one dared to take the lead in talking to land owners who built their pig cages on the canal, and three or four households who sowed rice on the canal, but after we developed action plans, the person responsible for each action took the lead in facilitating and organizing formal discussions. The commune chief also participated when we convened meetings with landowners who used the canal. We kept working on the action plans, we often met with villagers and discussed which actions should be taken. The issue was resolved. The landowners agreed to move their rice sowing away from the canal and another rich land owner agreed to move their pig cages. We are happy about this.

These reflections reveal that in spite of needing a much deeper understanding of social difference within the original action planning groups, in some cases, the process of bringing people together to plan actions was beginning to open up opportunities to address power dynamics that stood in the way of improving livelihoods and productivity. These emerging opportunities created momentum for the facilitation teams to further catalyse change during the next phase of work, and in turn to inform the detailed design of research interventions by system level stakeholders.

5.4. July–December: 2014: Deepening and broadening community engagement³

From July to August 2014, the community facilitation teams reconvened to plan for the design of the proceeding stages of implementation using improved understanding of who was participating and who was not. Analysis of the results of the well-being exercise (shown in Table 1) showed that in all

Table 1. Number and percentage of participants from each wealth group that participated in the original visioning exercise

	Wealth group 1	Wealth group 2	Wealth group 3	Wealth group 4	Total*
Land-based	7 = 10%	32 = 47%	20 = 29%	9 = 13%	68
Water-based	4 = 2%	49 = 32%	56 = 36%	45 = 29%	153

*A total of 70 participants from land based villages were involved in community visioning and 155 participants from water based villages were involved. Wealth groups of two participants from Land Based and two from Water Based village types are missing from Table 1.

villages during the initial visioning exercise there were fewer participants from the highest wealth groups. Specifically, in the land-based villages, most participants were from the middle wealth groups with less participants from the lowest, while in the water-based villages, there was a more even distribution of participants from within the three lower wealth groups.

This indicated that initial engagement had reached some of the poorer households. The monitoring maps in all villages further revealed that participants in the original visioning resided in households that were located close together in one part of the village. These findings suggest that while the original visioning groups that the NGOs had convened did not represent just elite members of the communities, they did have a neighbourhood bias. These findings informed the design of subsequent stages of community engagement, in particular the broadening of engagement to more distant parts of the villages.

From August to September 2014, community facilitation teams spent five days in each of the twelve villages intentionally reaching out to those who had not been engaged previously and particularly focusing on the poorer neighbourhoods and households. New villagers were engaged in discussions around the action plans through focus group discussions and one-to-one meetings. Some were pre-arranged with specific groups and others were reached more opportunistically. Most of the meetings comprised men or women separately, with few comprising mixed groups. Socio-economic data, such as age, ethnicity, gender and formal education was recorded for all participants. The focus of these discussions was to further explore community perspectives and concerns around water quality and health, land and water management and livelihoods diversification—the three areas identified in the strategic design framework which research was to support. Discussions were facilitated on opportunities and challenges in sustaining livelihoods, the underlying causes of the challenges they face and identifying steps needed to realise their potential and achieve their goals.

After each engagement session, the team transcribed the contributions made by participants and categorized them into themes. The thematic analysis took place during the village visits. There were many instances in which villagers also took part in the thematic analysis. The coding for each participant was recorded on each card, making it possible later to disaggregate the findings by these variables as well as providing insights into the inter-sectionality of different dimensions of marginalization (Johnson & Nurick, 2003). Throughout the five days spent in each village, the original monitoring map was updated with information from new participants, and was used to guide the process in the following days. A final verification meeting was held and the thematic analysis was presented back to those that attended.

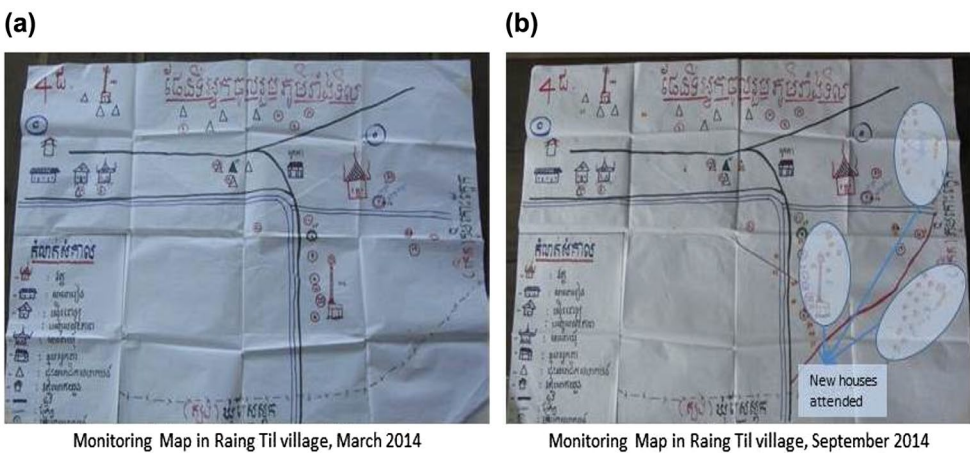
Reflections from villagers on the process highlight that they were learning a new way to engage with research and development. As a young woman from a floating village in Siem Reap said:

By participating in this meeting I can share my ideas, and what is happening in the village. I also learned from the discussion. I think this is new because I used to participate in meetings organized by other NGOs in which I just listened to the NGO people talk and sometimes I was told to develop plans that were already given to me. I just followed them. But in this meeting, I feel I am the one who talked and the one who analysed the situation in my village.

Upon completion of this phase, between September and November 2014, NGO partners compiled the data from the thematic analysis into a spreadsheet⁴ and conducted further thematic analysis to reveal patterns of perceptions and concerns of diverse community members in relation to the three research initiatives. This village level analysis was then brought to a cross village analysis workshop held in December 2014 in which both the extent of participation within each village was analysed, and cross-village themes were developed to later feed in to the design of specific research interventions.

The results showed that a total of 506 participants were reached through the engagement phase in 2014 (in addition to the 225 that had engaged in the community visioning exercise in September

Figure 3. (a) Location of homes in Raing Til and (b) engagement of households.



2013). Figure 3(a) and (b) illustrate the broadening of engagement as captured through the monitoring maps. Figure 3(a) depicts the homes of villagers in Raing Til (a water based village) that participated in the community visioning stage and Figure 3(b) depicts the homes of all those households reached by the end of 2014 identifying new households. The team also now knew that 125 of the total 506 participants in Raing Til came from women headed households.

Importantly, the numbers of villagers who came from the poorest households increased considerably (see Table 2). In the land-based villages the actual numbers of participants from wealth group 4 increased from 9 to 52 (from 13 to 25% of participants), and in the water based villagers from 45 to 101 (from 29 to 35% of participants). Yet while the actual numbers of participants from wealth group 3 also increased in land based villages from 20 to 42 this represents a decrease in proportional participation (from 29 to 20%) and in water based villages there was no change in the 36% of participants from wealth group 3. Overall, the results show that teams had been most successful at increasing proportionally the participation of the poorest households.

When looking across villages, teams reflected on the different levels of success in reaching out to the poorest groups. Factors that accounted for the differing degrees of success related to the capacity of the facilitation team—capacity of CFs, capacity of NGO staff, capacity of program staff—as well as contextual factors. For example, in some land based communities, such as Trumper, Bakou and Kampong Ko, large numbers of the poorest households migrate to Thailand to seek seasonal work. Their household size is reduced and those who remain must cover all productive activities. This seasonal migration coincided with the engagement activities, and as a result, in Kampong Ko, the teams managed to extend participation overall but mainly through reaching more households from higher wealth groups.

In water-based villages, on the other hand, teams were more successful in reaching out to the poorest households. In Phat Sandai, Prek Toal and Raing Til the CFs were very active, and the engagement coincided with the fish spawning season (June–October), a time of year when less people are away from home fishing. In Chhnoc Tru, however, the team was challenged to reach poorer

Table 2. Number of participants from each wealth group during deepening and broadening phase

	Wealth group 1	Wealth group 2	Wealth group 3	Wealth group 4	Total*
Land based	25 = 12%	89 = 42%	42 = 20%	52 = 25%	208
Water based	16 = 5%	66 = 23%	103 = 36%	101 = 35%	286

*A total of 217 participants from land based villages were involved in the deepening and broadening phase and 289 participants from water based villages were involved. The wealth group data for nine participants in land based villages was missing, and the wealth group data from three participants in water based villages was also missing.

neighbourhoods because of their ethnic diversity and engagement in commercial activities. In Muk Wat, Peam Ta Uor and Prey Chass the teams faced limited capacity and the NGO partners were unable to provide quality support, resulting in less successful engagement.

5.5. December 2014: Research initiative planning and reflecting on progress

Immediately after the cross-village analysis process a research initiative planning workshop provided opportunity for the results of the analysis to feed directly in to design of research interventions. The intent was that the interventions under the three broad research areas would be co-owned and co-developed by all stakeholders, finding ways to work across scale and across areas of expertise and interest. The workshop was designed and facilitated by program staff and supported by community facilitation teams, ensuring that community perspectives were heard. Participants at the workshop included those that had been involved in the program since its inception. As a planning process, the workshop aimed to move beyond a superficial understanding of addressing problems through research to build interventions that could tackle a common HDC and address local concerns based on their experiences. It brought together a diverse group of stakeholders to co-create solutions.

Using theory of change as the guiding framework, mixed groups of participants used multiple cause diagrams to map out possible pathways they felt could address local concerns and achieve development outcomes under each of the initiative themes. The starting point for the deliberations was a deeper understanding of the community concerns that emerged through the cross-village analysis, illustrating gendered differences within communities. For example, in relation to the land and water management initiative, in water based villages there was a difference in how men and women perceived the challenge with reduced fish stocks, with men more concerned about being constrained by new fishing regulations, while women were more concerned about their access to credit to sell their fish products. Opportunities identified to respond were also gendered, with men wishing to explore ecotourism as a vehicle for conserving flooded forests, while women emphasized collective approaches to building new business opportunities. In land based villages men were concerned with aquaculture as a viable intervention while women were more focused on improving rice production.

In exploring each of these areas of concern, participants identified drivers of change that are impacting on wild fish stocks (population increase, corruption, loss of flooded forest) and rice productivity (lack of water for dry season irrigation and the lack of technical know-how). They further deliberated on the relationships between different drivers, and networks of stakeholder involved. Participants also mapped the actors involved in livelihoods within communities, communes and districts, as well as those at the provincial level. Two-year objectives were articulated to address decreasing fish and rice productivity. The workshop concluded with a planning session that resulted in identification of activities, with timeframes and responsibilities. These plans, developed with some community representatives, opened up opportunities to create a direct link between agricultural research and the community action plans.

Government representatives shared views and perspectives and worked together with community facilitators and NGO representatives as they deliberated the possible pathways to outcomes. One government official felt that the workshop was unique as she had previously not observed local facilitators express such confidence when working with government level staff. She felt the CFs seemed to have gained confidence throughout their experience over the two years and could contribute meaningfully to discussions at the planning workshop.

The final PAR activity in 2014 was a second knowledge fair. Like the first, it presented an opportunity for the facilitation teams to share learning across their work in the twelve communities and reflect upon their progress. Focused on deepening and broadening engagement some noted that the implementation process was evolving from visioning and action planning with a specific group, in to a more critical facilitation process required in PAR. They noted they were building skills that enabled

them as facilitators to better understand local concerns. For example, one male facilitator said: “I am happy because by using these [PAR] tools, I will know better about community issues. In order to understand community issues, we need to talk to villagers, listen to them. We let villagers talk about their own problems and possible solutions. We can ask some probing questions to understand well. We can learn how they solve their own problems”.

6. Key learning on implementing PAR

We now discuss our learning in relation to our research question through reflecting on the principles of the PAR approach; co-ownership, equity and reflexivity.

6.1. Building co-ownership

The principle of co-ownership widely used in PAR practice refers to enabling non-researchers to fully participate as equals in the research process (Hall, 2001; Park, 2001). At the local level, PAR co-researchers included the poor and marginalized living within the selected villages. The strengths-based engagement process started with a small group of villagers who came to the initial meetings. Placing more emphasis on the quality of engagement and the skills required to be strengths-based was thought to be necessary at the outset given that the approach used was a departure from agricultural research practice which tends to plan the research *ex ante* and without first listening to community needs. As reflected by participants in activity evaluations, what stood out as useful in the approach was the emphasis on listening and the simplicity of the tools for facilitation. We found that this emphasis early on enabled a sense of co-ownership by those participating.

Horizontal relationships were also developed between members of the facilitation teams, some villagers themselves, through systematic collective planning and reflection at multiple levels, such as daily reflections while working in the villages, cross-village analysis and reflection processes as a team. Across these groups, we found that the appreciative mindset that was emphasized at the outset of the process through the CLCP training and mentoring became the anchoring point for building horizontal relationships leading to greater co-ownership. What this suggests is that using PAR as a process to build co-ownership must, necessarily move beyond use of participatory tools to engage with the mindset of facilitators first and foremost. As Chambers (1994) notes, the world-views, attitudes and values of researchers can influence the success of participatory methods.

Nonetheless, the team recognized early on that relying on NGO partners for building initial co-ownership resulted in participation limited to small groups of people in communities. The extent of co-ownership possible in each village was limited, increasing the risk of elite capture. To broaden participation, more complex PAR tools were introduced, such as well-being ranking and the coding grid. Our findings suggest that these tools did indeed go some way towards helping the facilitation teams better understand the social-economic context of villagers to then broaden participation in quantity as well as, in most villages, reaching a greater percentage of poorer households. We suggest, therefore, that it is possible to stage the introduction of more nuanced and critical tools building on the momentum established by listening and not analysing or identifying solutions at the outset. As Kaplan (2000) suggests, the skills needed for facilitating resourcefulness “must be achieved gradually, through guided reflection on action, through facilitated self-critique, through mentoring and sharing with peers ...” (p. 20).

However, we also experienced a tension as we shifted away from simple tools, to tools that enabled greater understanding of context and consequently created a greater researcher-researched divide. For experienced action researchers, this is one of the fundamental tensions to engage with—to balance an emancipatory stance with bringing analysis and rigour to the learning process (Reason, 2006; Roberts & Dick, 2003). For the NGO staff members of the facilitation teams, this new way of working challenged their capacity to use more complex tools that required systematic documentation of the process to ensure rigor. These teams were just beginning to learn how to manage the tension and their capacity development journey for quality PAR was ongoing. This is not surprising given that capacity of local facilitation teams has been shown to be a major challenge in

operationalizing similar approaches (for example Humphries et al., 2015; Kristjanson et al., 2009). As NGO staff suggested throughout the process, more researcher expertise was required to support them. Our learning, therefore, is that the skills to build strong documentation and rigour in to an emancipatory process need to be supported in real time. We suggest that this is best done through working side by side in the field, which in turn requires researchers to have the time and to be more committed to accompaniment of facilitation teams in the field.

Supporting co-ownership of the poor and marginalized through PAR requires that plans for intervention by development and research stakeholders must follow development agendas. This was a challenge for both the NGOs and researchers involved. Our experience adds weight to the view that in part the challenge lies in shifting NGO staff mindsets to treat community members as equal actors (e.g. O'Leary & Meas, 2001). The shift required is from understanding their role as delivering services to facilitation of community development. We found that while facilitation teams were often able to uncover sensitive issues that needed addressing, NGO partners were unsure of how to respond. For example, in one water-based village the sensitive issue of fishery law implementation was prioritized by the community yet the supporting NGO had expertise in health and sanitation and consequently felt unable to respond. Further, in the political setting of Cambodia in which NGOs are often regulated through top down measures, supporting community defined emancipatory goals that may be in conflict with government defined interventions leads to further challenges.

The power relations between stakeholders and barriers this caused was even more obvious during the system level PAR process. We found that initially, during the planning and design phase, there was a strong sense of co-ownership across stakeholders that were not used to working together—government, universities and NGOs. Being a convener in a space that was not well networked was a role the program could easily play and it created new relationships. Starting with joint visioning created space for identifying how different agencies' roles contribute to the goals of all. At this early stage, strong co-ownership of the system level process by the stakeholders was evidenced through continued participation and enthusiasm.

As the research initiatives took shape, however, spaces intended to build collaboration across scales became contested. Researchers were not used to having to wait to plan their specific research agenda such that it would contribute to the process that was being driven by others at what they considered a lower and therefore “less important” level. The participatory planning of the initiatives using theory of change went some way to creating a space to plan together across scales. What was instrumental in that process was the confidence gained by the community facilitators to engage with stakeholders they would previously have considered to be “above” them. We suggest that programs attempting a cross-scale PAR process must be cognizant of their role in supporting stakeholders as they navigate complex change processes in which existing power relations may constitute barriers to change.

6.2. Ensuring equity in process and outcomes

The program had bold intentions to reach the marginalized and support transformative change from the outset. This transformative agenda was further described by Kantor and Apgar (2013) as focused on positive change for the poor while recognizing the trade-offs this comes with, and as building on theories of social transformation (e.g. Castles, 2003) and gender transformative change (Kabeer, 1994, 1999). The field of transformative learning (e.g. Brookfield, 2000) argues for use of critical reflection, action and dialogical processes to support a shift in mindsets (Johnson & Wilson, 2009; Kreber, 2004). In CRP AAS, the practice of critical reflection and dialogical processes was designed to take place within the PAR engagement cycles of the program, to “dig deeper” and uncover underlying structural constraints for the marginalized.

We found that deepening PAR engagement with communities was accomplished through bringing a more critical lens to social dimensions and being aware of power dynamics within the process. This deepening was staged (as discussed above), to build on the trust and momentum gained

through coalescing around common goals and developing local agendas for action. The team recognized that conflation of the initial groups engaged in communities—often existing committees that worked with the NGOs—into the views and interests of the marginalized had the potential to reinforce existing power relations within communities through the attention to elites within the villages (as cautioned by Fals Borda, 1999; Smith, Bratini, Chambers, Jensen, & Romero, 2010). In response, deepening and broadening engagement was based on first better understanding who was marginalized and who was not, and then creating more space for their participation. Our findings suggest that this strategy was, at least in part, successful. The well-being exercise provided information on the social and economic diversity found within the communities, which then illustrated if and how the marginalized were engaged (see Table 1). With this information, the teams were able to put strategies in place to increase participation of the marginalized. The results of the broadening and deepening engagement, however, as shown in Table 2, tell a mixed story. This suggests that revealing disparities between households may well be a necessary condition for equitable engagement, but it is by no means sufficient.

We suggest there are two main reasons moving from understanding marginalization to being able to address it within program planning and implementation is challenging. First, as noted above, the facilitation teams, and in particular the NGO partner staff, did not have experience with this new paradigm of development practice that moved them away from their usual project based practice. Researchers need to bring a critical stance to move beyond superficial and sometimes inadequate group processes to understand power differentials and their effects (Maguire, 1987). Using critical reflection to engage with marginalization and power was implicitly part of the PAR tools, and through time required a more explicit focus to ensure engagement was not just broadened but also deepened. The capacity development approach that supported the facilitation teams was based on mentoring and on the job support. As discussed by Douthwaite et al. (2015) our conclusion is that learning by doing, working to bridge silos in the process and being critically reflective over time are solid strategies for deepening mindsets and therefore enacting the principle of equity.

The second reason is entrenched power dynamics within communities themselves that the transformational approach challenges directly. As O'Leary and Meas (2001) indicate, a transformative approach requires recognizing feelings of those involved to overcome inherent fears and negotiate new social arrangements. We have evidence from some villages that facilitation skills helped overcome power struggles within groups. For example, in one water and land based village one of the action plans focused on canal expansion. Villagers that attended the action planning aimed to expand the water canal in response to its narrowing by elites who used it for their rice plantations and pig rearing activities. During the first action plan review process, we found that villagers feared talking with the landowners who controlled the canal. In response, the local supporting NGO helped to convene meetings with the commune chief and broker conversations with the landowners. As a result, the canal was expanded as planned and the pig cage was removed. This example illustrates the central role that facilitation can play in helping to create “safe” or “communicative” spaces (Cornwall, 2003; Wicks & Reason, 2009) to address power inequalities.

Yet, good facilitation alone is not always enough, particularly when related to complex issues of resource management. This is exemplified in the case of two communities, both water based villages, where strong links between powerful commercial fishers and local authorities undermine access to wild fish stocks for the poorest households. Those that can afford to pay enforcement officers use fishing gear that is banned. Similarly, fish farming of prohibited species is accessible to those who can afford to pay. Addressing these structural inequalities necessarily requires efforts that span beyond just the local.

The PAR approach as designed across scales was, in theory, well placed to address inequality. To achieve the equity principle in practice, however, bridging alone is not enough. What is required are skills to engage with power within the bridging networks. Similar to what we have found at the community level, our results on how well this worked in practice are mixed. One illustrative example is

through the work of a national partner within the initiative on water quality and health. The partner has a mandate to improve services and quickly responded to the community action plan around poor water quality through fixing the water filter stations. The approach used by the partner resulted in more community conflict and elite capture and undermined attempts of researchers and community members working towards more equitable community based water management schemes (Apgar et al., 2017). What this example illustrates is that the dangers of reinforcing power relations were much harder to navigate when dealing with powerful institutions that are part of a hierarchical political system. Nonetheless, some progress was made through the research facilitation teams creatively opening up safe spaces, outside formal conversations with leadership that led to far greater appreciation of the situation as elite capture. This adds an understanding of reflexive practice as a critical skill that enables “serendipity” of PAR that moves beyond application of a structured design (for example, Burns, 2007; Colfer et al., 2011) to find ways to challenge existing power relations.

6.3. Reflexive practice to support learning

Reflexivity and “first person” positionality of the researcher in action research is one of the fundamental shifts it attempts that confronts positivist methodologies (Gluck & Patai, 2013). The design of reflexive practice was also intended to support a learning-focused monitoring and evaluation system, recognizing that in situations of complexity how interventions lead to impact is not easily understood at the outset (see Apgar et al., 2016; Douthwaite, Apgar, & Crissman, 2014). Kaplan (2000) claims that shifting the paradigm of research and development from delivery of resources to facilitating resourcefulness requires understanding and “reading” the development process as it unfolds. The skills required include some of the skills we saw the research facilitation team develop over time, being open and non-judgmental, quickly making sense of and drawing insight out of discussions to guide conversations. This was achieved in several ways through the PAR practice. First, the use of after action reviews as tools for evaluative conversations at the end of an event or a period of implementation were institutionalized from the beginning. They were embedded across all scales and used after every event facilitated with communities, as well as after events facilitated with system level stakeholders, and annually with stakeholders through knowledge fairs, and internal team reflections. Further, at the community engagement level, the PAR guide used within the capacity development program (see Nurick & Apgar, 2014) made reflexivity explicit.

7. Conclusions and recommendations

We have shared our findings about critical factors that enabled or inhibited implementation of a participatory approach to agricultural research according to principles of co-ownership, equity and reflexivity. We have argued that our emphasis on the mindset required to build co-ownership early in the process, and to start with shared visions, proved successful. We have also learned that introduction of tools to reveal disparities between households should be staged and build on the momentum already in place. We suggest that using these tools is a necessary condition for equitable engagement, but it is by no means a sufficient one. The more challenging aspects of building facilitation skills for use of critical reflection is not to be underestimated and requires commitment of researchers to accompany facilitators in the field, and appreciate their role in large part to be developing the capacity of teams made of mixed development and researcher expertise.

In complex social-ecological systems, addressing poverty is not possible through engaging only at the local level. Working across scales is often when major challenges with power dynamics between stakeholders emerge. We embarked upon a systems design of PAR with stakeholders across scales to guide design of the research program to meet local needs as well as addressing systemic issues. In a crowded development context such as the Tonle Sap, where organizations are used to hierarchical engagement, maintaining co-ownership across scales was not easy. At times, we faced internal resistance by researchers who were unaccustomed to letting stakeholders set the agenda and from leaders who did not always align with the use of what to them was a “new” approach. Further, some of the NGO partners had to negotiate a new way of understanding their role from providers of solutions to facilitators of change. Yet we also have had success. The group of nine NGO partners that worked together on PAR have now formed an alliance to continue work in the Tonle Sap, and a key

area of work included in their new strategy is to build greater capacity for use of PAR. In conclusion, we are cautiously optimistic that we have made some small contribution to the paradigm shift to meaningful and potentially transformative practice in the Tonle Sap.

Funding

This work was supported by the CGIAR Research Program on Aquatic Agricultural Systems.

Acknowledgements

We wish to acknowledge the experiences, capacity, dedication and meaningful engagement of all of the local facilitation teams, without which this experience would not have been possible. Their wisdom was essential to helping us all learn from a challenging and innovative program.

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Citation information

Cite this article as: Working towards an engagement turn to agricultural research in the Tonle Sap Biosphere, Cambodia, J. Marina Apgar, Ram Bastakoti, Sochanny Hak, Robert Nurick & Julie Tsatsaros, *Cogent Food & Agriculture* (2017), 3: 1368108.

Notes

1. Constellation, a community development organization based in Belgium, was contracted as a partner of CRP AAS to support this capacity development in all program countries, including Cambodia. A detailed description of the approach used can be found at www.constellation.org.
2. Four categories of well-being were identified and used for subsequent analysis (details shown in Appendix 1).
3. The training and support for this phase of the PAR was provided by Development Focus, drawing on their accredited PAR training program See www.developmentfocus.org.uk for further details
4. Each NGO entered the data into a common pre-designed Excel spreadsheet. It was decided to use Excel rather than another software, such as NVIVO, as all NGO staff had access to Excel and were competent in its use. The same could not be said for alternative software packages.

Cover image

Source: WorldFish.

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Appendix 1

Well-being characteristics of households in the two agroecological zones

	Water based villages	Land based villages
Wealth group 1	Large scale wild fishers & fish farmers with capital equipment; hire out equipment to others; diverse income sources from paid employment; local business & trading; providing loans; children are at school and universities; large houses & this group owns property outside the village	Large rice farms and this group owns capital equipment and hires labour; they also own many water buffalo; can access loans from bank; operate money lending businesses; children go to school and universities
Wealth group 2	Medium scale fishers who own at least one boat; can access loans from banks or MFIs; provide small loans; this group includes fish processors and traders; some migrate to Malaysia; paid employment – includes civil servants, mechanics, and carpenters	Own smaller rice farms and a few cattle; non-mechanized tractors; self-sufficient in planting rice; traders specialized in fertilizers, pesticides and fuel; supplemental income through fishing, construction; children not able to attend junior school and higher grades; children migrate; many indebted to MFIs; some lend money to poorer households (Wealth group 3 & 4)
Wealth group 3	Small thatched houses; gather and sell firewood; traders; may own a fibre glass boat; hire out labour for fishing and fish processing; hire fishing gear or take out loans to purchase; small debts	Small rice farms; few capital assets; not self-sufficient – up to six months per year have income shortfalls; depend on selling labour and fishing; children and adults migrate to Thailand; indebted
Wealth group 4	Live in small huts or are homeless; no capital or access to credit; work as labourers or hired to process fish; heavily indebted; disabled adults; female headed households; children do not go to school	Small plots of land or landless; depend on fishing; sell seasonal labour in return for food; undocumented migration; heavily indebted; no access credit from MFIs; sick and disabled family members



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